Huntsville City Schools
2020 – 2021 Pacing Guide
8th Grade Physical Science

Important Notes:

- Alabama Course of Study objectives are given by number
- This curriculum map's standards are aligned to the Alabama Course of Study.
- Resources and Instructional Strategies are suggestions for the topic studied; teachers are not required to use all resources listed and can supplement their teaching with additional resources that support the Course of Study Standards.
- The number of days listed are approximate and are padded to allow a little extra time for review and tests
- The problems listed for each section are suggested types of problems. Teachers can still assign even, odd, or selected problems from each type of problem.
- To access ELL or Discovery Ed lessons, you must be logged in using your school email and password.

Online Resources:

- Khan Academy – Example videos and practice activities that may be of additional help to students: https://www.khanacademy.org/
- Shmoop – Teachers and students can use Shmoop to view videos and practice on various math topics searchable by Common Core State Standard: https://www.shmoop.com/
- Open Curriculum – activities from all over the internet sorted by standard: www.opencurriculum.org
- Discovery Education Techbook (link on Clever)
- Phet Colorado Simulations (www.phet.colorado.edu)
- AMSTI Online (www.amsti.org)
- Ellevation (link on Clever)
- Middle School Chemistry (www.middleschoolchemistry.com)
- ALEX (use for vocabulary for Word Wall) (https://alex.state.al.us/standardAll.php?grade=8&subject=SC2015&ccode=PS8&summary=2)
- PBS Learning (https://aptv.pbslearningmedia.org)

Instructional Strategies:
ELLevation: Note: Be sure to check the "Science Collection" for specific topic resources"

Build Background:
* Brainstorm Walk * I Notice, I Wonder

Clarify Input:
* "5 and 2" * Anchor Charts * Essential Questions * Guided Notes * "Teach! Teach!" * TPR

Fortify Output:
* Find Your Match * Clock Buddies * Think, Write, Pair Share * Which Corner?

Foster Interactions:
* "Don't Mention it" * Find the Fib

Develop Academic Language:
* 360 Words * Word Walls

Assess Language and Learning:
* Wordless Books * Whiteboard Checkpoints * Differentiated Question Prompts

ARI/Instructional Strategies (Alabama Reading Initiative)

ARI represents the Alabama Reading Initiative. Below are ARI/Instructional strategies that can be easily adapted to work well with mathematics. Some of the strategies can be interchangeable between before, during, and after in lesson planning. There are many instructional strategies that can be used in the classroom and you are not limited to these alone. If you have other ARI/Instructional strategies that work well for you and your students, use them to assist with academic growth and development. Have fun experimenting with different strategies to reach all students and address the different learning styles.

Suggested time period	ARI/Instructional Strategy	Explanation/How to use the strategy
Before:	Admit Slip	Purpose: 1) reflect on content of previous lesson or learned concept The admit–slip strategy requires students to write responses to questions you pose at the beginning of class. Admit slips help students reflect on what they have learned and express what or how they are thinking about the information. Admit slips easily incorporate writing into your content area classroom and require students to think critically.
	KWL	Purposes: 1) link prior knowledge to new information 2) generate questions to guide meaningful learning 3) create own meaning and learning from new text Procedure: 1. On the whiteboard, on a handout, or on students' individual clean sheets, three columns should be drawn. 2. Label Column 1 K, Column 2 W, Column 3 L. 3. Before reading, viewing or listening, students fill in the Know column with words, terms, or phrases from their background or prior knowledge. If the students are drawing on a topic previously learned, then the K column may be topic related. But if the topic is something brand–new, and they don't know anything much about it, you should use the K column to have them recalling a similar, analogous, or broader idea. 4. Then have students generate questions about what they might learn or want to learn about the topic, which might follow a quick glance at the topic headings, pictures, problems and charts that are found in the text or on a handout provided. This helps set their purpose for the lesson or concept and focuses their attention on key ideas. 5. After the math lesson and reading, students should fill in their new knowledge gained from the content. They can also clear up misperceptions about the topic which might have shown up in the Know column before they learned anything about the topic. This is the stage of metacognition: Does the student fully understand?
	Think Pair Share	Purposes: There are a variety of uses for this activity 1) Think. The teacher provokes students' thinking with a problem, question, prompt or observation. The students should take a few moments just to THINK about the question and jot down their thoughts. 2) Pair with someone…Using designated partners, nearby neighbors, or a desk mate, students PAIR up to talk about the answer each came up with. They compare their mental or written notes and identify the answers they think are best, most convincing, or most unique. 3) Share. After students talk in pairs for a few moments, the teacher calls for pairs to SHARE their thinking with the rest of the class. Sharing can be accomplished in a variety of ways: going around in round–robin fashion, calling on each pair, taking answers as they are called out (or as hands are raised), pairing with another pair. Often, the teacher or a designated helper will record these responses on the board or on the overhead.

	Quick Write	Purposes: 1) introduce a concept and connect this concept with prior knowledge or experiences and 2) allow students to discuss and learn from each other Procedure: 1. Introduce a single word, phrase, problem, or question to the class. 2. Students copy the concept on index cards or sheet of paper. 3. Students are given two to five minutes to write whatever comes to their minds relative to the concept. They may write freely using single words, phrases, sentences, etc. 4. After time is called, students may volunteer to share their thoughts on the subject.
	Turn and Talk/ Table Talk	Purposes: 1) activate prior knowledge, 2) build background knowledge, 3) encourage active listening, and 4) set a purpose for concept/lesson or reading Procedure: 1. Write a thought–provoking statement or question related to the subject of the upcoming lesson on the whiteboard or project overhead. 2. Each student has two minutes to read the question or statement, reflect, and write a response. 3. Each student has three minutes to share his/her response with a partner, reflect, and write a response to his/her partner's statement. 4. Pairs combine to form small groups of 4–6 students. Responses are shared within the group and one response is chosen to share with the whole class.
	Bell Ringer/Bell Work/Warm Up	Bell ringers are questions or tasks posted before students enter the classroom. They are to be completed before class starts, or, as the name suggests, as the bell rings. Bell ringers provide benefits to both the student and the teacher in all classroom settings ranging from elementary to high school. Bell ringers help to encourage promptness, organization, responsibility, spark prior knowledge, reinforce concepts, promote student engagement and so much more.
During:	Think Pair Share	Purposes: There are a variety of uses for this activity 1) Think. The teacher provokes students' thinking with a problem, question, prompt, or observation. The students should take a few moments just to THINK about the question and jot down their thoughts. 2) Pair with someone…Using designated partners, nearby neighbors, or a desk mate, students PAIR up to talk about the answer each came up with. They compare their mental or written notes and identify the answers they think are best, most convincing, or most unique. 3) Share. After students talk in pairs for a few moments, the teacher calls for pairs to SHARE their thinking with the rest of the class. Sharing can be accomplished in a variety of ways: going around in round–robin fashion, calling on each pair, taking answers as they are called out (or as hands are raised), pairing with another pair. Often, the teacher or a designated helper will record these responses on the board or on the overhead.

	Turn and Talk/ Table Talk	Purposes: 1) activate prior knowledge, 2) build background knowledge, 3) encourage active listening, and 4) set a purpose for concept/lesson or reading Procedure: 1. Write a thought–provoking statement or question related to the subject of the upcoming lesson on the chalkboard. 2. Each student has two minutes to read the topic, reflect, and write a response. 3. Each student has three minutes to share his/her response with a partner, reflect, and write a response to his/her partner's statement. 4. Pairs combine to form small groups of 4–6 students. Responses are shared within the group and one response is chosen to share with the whole class.
	Jot Notes	Jot Notes are basically lesson notes the students jot down before, during and after the lesson (in some cases) …The notes can be given in a variety of formats or structures…Example: chart format, graphic organizer, table format, guided notes, foldables, etc.…
	Quadrant Cards / Frayer Model	Purposes: 1) motivate students to engage in vocabulary study and expand vocabulary 2) Reinforce concepts etc.…. Procedure: Divide a sheet of paper into four parts Adapt to meet your students' needs…. whether you want to emphasize on vocabulary, connecting concepts, or organizing steps or procedures for graphing or solving etc.…
	Venn Diagram	Purpose: compare concepts Procedure: 1. Draw two circles overlapping. Each circle represents a concept. 2. Unique characteristics of the two ideas being compared are recorded in the outer of the two overlapping circles. Common characteristics are recorded where the circles overlap. 3. Teacher should model the strategy first.

	Charts/Foldables	Purposes: 1) engage with concept/lesson/text 2) construct graphic organizer/chart/foldable 3) self–monitor comprehension Procedure: 1. Create a Jot Chart, project on the whiteboard or produce a print copy for each student. The chart/matrix should be structured as follows. You can also use foldables to accomplish these tasks. o Main ideas/items for description or analysis are listed across the top of the chart. o Question/characteristics of the main concepts are listed down the left side of the chart. 2. Discuss the purpose of the chart with students before the assignment. Give an example of a completed chart to help clarify its functions. 3. Have students complete the chart or foldable as you go through the lesson or assign tasks to groups etc...As the teacher, you decide and adapt this to meet the needs of your students and what you want to accomplish from the task. 4. Discuss the students' findings and compile the results into a group chart. Stress the relationships between the data in the chart.
	Partner Learning	Purpose: 1) To engage students in the content and spark meaningful discussions 2) To encourage collaboration and improve knowledge among students 3) Promote socialization and boost self–esteem 4) Reinforce concepts taught through open questioning and answer sessions Procedure: The students are paired up and given a task to complete together; open discussions, sharing of ideas, writing, final product presentation, etc....
	Concept Map	Purpose: activate and organize knowledge about a specific topic Procedure: 1. Select the main idea or topic of discussion; write it on a chart, overhead, or whiteboard; and put a circle around it. 2. Have students brainstorm subtopics; knowledge related to the topic. Use lines to connect to the main topic. 3. Have students brainstorm specific vocabulary, ideas, mathematical knowledge related to each subtopic. Record these ideas beneath each subtopic. Add new knowledge to the concept map as learning progresses.
	Graphic Organizer	Purposes: 1) provide a visual model of the structure of lesson and 2) provide a format for organizing information and concepts Procedure: 1. Introduce the graphic organizer to the students. Demonstrate how it works by noting key concepts and ideas on the organizer. 2. Have groups of students practice using the graphic organizer with ideas from independently read mathematical text and/or mathematical information presented during lessons. Students can share their ideas with the class. 3. Choose an organizer that matches what you want to accomplish with your students for the topic or lesson.

	Jigsaw	Purposes: 1) engage with mathematical concept or text 2) self–monitor comprehension 3) integrate new information with prior knowledge 4) respond to mathematical concept or text through discussion Procedure: 1. Divide class into 4–6 member groups; each member becomes an expert on a different topic/concept assigned by teacher. 2. Members of the teams with the same topic meet in an expert group with a variety of resource materials and texts available to explore their topic. 3. The students prepare how they will teach the information to others. 4. Everyone returns to their jigsaw (home) teams to teach what they learned to the other members. It may be helpful to supply each student with a graphic organizer for note taking purposes. 5. Team members listen and take notes as their classmate teaches them
After:	Cooperative Learning/ Partner Learning/Practice	Cooperative learning is the process of breaking a classroom of students into small groups so they can discover a new concept together and help each other learn. Each group is given a task or assignment to complete. Often a record keeper and team leader are assigned to keep everyone on task. Collaboration and discussion are expected with a final assignment or project completed and submitted. Open discussions between the teacher and/or students can occur during class as well.
	Stations/ Carousels etc.…	Purposes: This strategy can fit almost any purpose developed. Procedure: 1. Teacher determines what topics/lessons will be placed on chart paper. 2. Chart paper is placed on walls around the room. 3. Teacher places students into groups of three– four. 4. Students begin at a designated chart. 5. They read the question or phrase, discuss with group, and respond directly on the chart or assigned task sheet. 6. After an allotted amount of time, students rotate to next chart. 7. Students read next question and records new response or discussion points. 8. Continue until each group has responded to each prompt. 9. Teacher shares information from charts and conversations heard while responding. ** This strategy can be modified by having the chart “carousel” to groups, rather than groups moving to chart.

	Exit slip	Purpose: 1) reflect on content of lesson The exit–slip strategy requires students to write responses to questions you pose at the end of class. Exit slips help students reflect on what they have learned and express what or how they are thinking about the new information. Exit slips easily incorporate writing into your content area classroom and require students to think critically. There are three categories of exit slips (Fisher & Frey, 2004): • Prompts that document learning, o Ex. Write one thing you learned today. o Ex. Discuss how today's lesson could be used in the real world. • Prompts that emphasize the process of learning, o Ex. I didn't understand… o Ex. Write one question you have about today's lesson. • Prompts to evaluate the effectiveness of instruction o Ex. Did you enjoy working in small groups today?
	Turn and Talk/Table Talk	Purposes: 1) activate prior knowledge, 2) build background knowledge, 3) encourage active listening, and 4) set a purpose for concept/lesson or reading Procedure: 1. Write a thought–provoking statement or question related to the subject of the upcoming lesson on the whiteboard or project overhead. 2. Each student has two minutes to read the question or statement, reflect, and write a response. 3. Each student has three minutes to share his/her response with a partner, reflect, and write a response to his/her partner's statement. 4. Pairs combine to form small groups of 4–6 students. Responses are shared within the group and one response is chosen to share with the whole class.

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	Hands on Activity/ Graphs, charts, diagrams, etc.	Hand on activities are simply activities which students physically in some way connect with their learning…writing, drawing, graphing, demonstration through movement, use of manipulatives etc.… Hands–on activities are especially important in the classroom because it allows students to engage in kinesthetic learning. Educational studies have shown that kinesthetic learning, where a student performs some type of physical activity rather than just listening to a lecture, is the most popular type of learning with students – doing or working on something before, during, and/or after the lesson, helps them to gain a better understanding of the material. It allows students to experiment with trial and error, learn from their mistakes, and understand the potential gaps between theory and practice. It also encourages students to collaborate with their peers and share information from different perspectives.

Formatting:

- Honors or advanced material is highlighted in blue. Example: Advanced: Page 145 #75–86
- Remediation is highlighted in yellow. Example: Remediation: Small group on fractions

The Textbook for this course is:

Discovery Ed Online Textbook

Huntsville City Schools
2020 – 2021 Pacing Guide
8th Grade Physical Science

First Semester
1st 9 – weeks (August 17 – October 23)
44 instructional days; 22 A–Days and 22 B–Days

Time Period	Unit Topic	Standards	Resources
10 days	Scientific Method, Lab Safety, & Equipment	Pre–Learning Concepts and Review: • Students can conduct a Scientific Investigation. • Students can create a graph using a table created with data collected by the student with independent and dependent variable represented. • Students are familiar with lab equipment and understand the safety procedures while in the science lab.	**Flinn Scientific Lab Safety Form** https://www.flinnsci.com/api/library/Download/e225ec725e1f4865a465395b1e79e6c0 **SpongeBob Lab Safety** https://sciencespot.net/Media/scimthdsafety.pdf **SpongeBob Scientific Method Part 1** https://sciencespot.net/Media/scimethodconvar.pdf or https://www.murrieta.k12.ca.us/cms/lib5/CA01000508/Centricity/ModuleInstance/9272/Spongebob%20pdf.pdf **SpongeBob Scientific Method Part 2** https://sciencespot.net/Media/scimethodconvar2.pdf **Zombie Lab Safety** https://www.ncbionetwork.org/zombie–college/ **Gummy Bear Lab** https://www.gcbe.org/site/handlers/filedownload.ashx?moduleinstanceid=10577&dataid=6769&FileName=Gummy%20Bear%20Lab–complete%20SM%20process.pdf **Carolina Scientific Lab Safety** https://www.carolina.com/teacher–resources/Document/lab–safety–worksheet/tr39129.tr **Discovery Ed Textbook –** search for scientific method **Ellevation**: – Understanding the Scientific Method – Using the Scientific Method

			***Other Websites:** –Whirligig Lollapalooza https://www.nms.org/Portals/0/Docs/FreeLessons/MG_Whirligig%20Lollapalooza_web%20CC.pdf –Measurement Practice –Metric Olympics https://aptv.pbslearningmedia.org https://www.nsta.org https://sciencespot.net/ https://www.acs.org/content/acs/en/education/resources/k–8.html http://www.chem4kids.com/ http://www.physics4kids.com/ *TDW Strategies:* Write a short summary that compares and contrasts two short articles or poems about Scientific Inquiry. OR Passing Mustard Writing Prompt: Read the following story Passing Mustard. Bacteriologists, like all scientists, use a certain process as they conduct their investigations. After reading the passage, explain how the writer used the scientific method to conduct their investigation. How did using this method credit or discredit their findings? **Honors:** APLUS COLLEGE READY – MINI METRIC OLYMPICS Shadow Graph Activity: Students will review a data set table to determine trends in data and then create a line graph including all major graph components to visually illustrate trends in data. *Or* Create a demonstration using music/art/dance to explain scientific method. **Remediation:** In small groups have students create posters for each part of the scientific method. Then do a gallery walk. *Or* Spiraling reviewing, re–connect/review a prior topic to the current topic

12 Days	Introduction to Matter	ALCOS 2 Plan and carry out investigations to generate evidence supporting the claim that one pure substance can be distinguished from another based on characteristic properties. ALCOS 3 Construct explanations based on evidence from investigations to differentiate among compounds, mixtures, and solutions. ALCOS 3A Collect and analyze information to illustrate how synthetic materials (e.g., medicine, food additives, alternative fuels, plastics) are derived from natural resources and how they impact society.	AMSTI Kit —Mixtures, Compounds, & Elements –Lesson 1: The Nature of Matter –Lesson 2: Pure Substance or Mixture? –Lesson 6: Breaking Down a Compound –Lesson 5: Changing Mixtures –Lesson 3: Separating a Soluble and Insoluble Substance Discovery Ed Textbook – Lesson 1.2: Characteristic Properties of Matter Middle School Chemistry: –Lesson 1.3: The Ups and Downs of Thermometers –Chapter 3: Density Phet Simulations: – Build an Atom, Build a Molecule, Isotopes & Atomic Mass, & Density Other Resources: –Chemical and Physical Properties Lab (CSI) –Ellevation: Chemical and Physical Changes –Ellevation: Classify Materials and Predict Changes –Rock Candy Lab –SMALL LAB: Chemistry Titration E–books from NSTA– *Atoms* *Chemical Reactions* *Matter/Elements/Periodic Table* TDW Strategies: Write a paragraph describing the advantages and disadvantages on the impact of synthetic materials in our society. Or Quick Write: Constructed Response on Discover Education Honors: In collaborative groups create a research based visual/oral presentation on the impact synthetic material, derived from natural resources, have on society. Students may use Padlet, PowerPoint, etc. to create their digital presentation and should include real world impacts on society. Remediation: Reteach vocabulary by completing an interactive guide on the properties of matter and their interactions.

20 Days	State of Matter: Solid, Liquid, Gas	ALCOS 5 Observe and analyze characteristic properties of substances (e.g., odor, density, solubility, flammability, melting point, boiling point) before and after the substances combine to determine if a chemical reaction has occurred. ALCOS 6 Create a model, diagram, or digital simulation to describe conservation of mass in a chemical reaction and explain the resulting differences between products and reactants. ALCOS 7 Design, construct, and test a device (e.g., glow stick, hand warmer, hot or cold pack, thermal wrap) that either releases or absorbs thermal energy by chemical reactions (e.g., dissolving ammonium chloride or calcium chloride in water) and modify the device as needed based on criteria (e.g., amount/concentration, time, temperature)	**Briefly review Mixtures, Compounds, Elements** **AMSTI KIT: Properties of Matter:** –Lesson 1: Our Ideas About Matter –Lesson 2: Determining Density –Lesson 3: Density Predictions –Lesson 4: Do Gases Have Density? –Lesson 5: Temperature and Density –Lesson 6: Applying the Heat –Lesson 7: Just a Phase –Lesson 8: Changing Matter and Mass **Discovery Ed Textbook –** Lesson 1.3: States of Matter **Middle School Chemistry:** –Chapter 1: Matter– Solids, Liquids, and Gases –Chapter 2: Changes of State **Phet Simulations:** States of Matter: Basics, States of Matter, Gas Properties **Lab:** Popping the Kernel: Modeling States of Matter **Particulate State of Matter:** PBS Interactive: **Other Resources** –Ellevation: Phase Changes –Homemade Snow Lab –Oobleck Lab ***TDW Strategies:*** Save the Last Word for Me: students read text and creates cards that evoke a reaction for them. Students then discuss their selections (similar to Socratic Seminar) **Honors:** Use Digital Storytelling or a Blogg to create a short story teaching elementary students the molecular differences between solids, liquids, and gases. **Remediation:** Reteach solids, liquids, and gases using Carousel teaching strategy. Or Reteach using Discovery Education: Skill Builder (Solids, Liquids, Gases) https://hsv–k12.discoveryeducation.com/learn/player/a43200c7–22ae–4f6b–9935–33cd48f2b28e

2nd 9 – weeks (October 26 – December 22)
38 instructional days; 19 A–Days and 19 B–Days

Time Period	Unit Topic	Standards	Resources
18 Days	Atoms: History of atomic models Atomic structure Periodic table Types of bonding	ALCOS 1 Analyze patterns within the periodic table to construct models (e.g., molecular–level models, including drawings; computer representations) that illustrate the structure, composition, and characteristics of atoms and molecules.	**AMSTI Kit —Mixtures, Compounds, & Elements** –Lesson 7: Examining and Grouping Elements –Lesson 8: Combining Elements –Lesson 9: Exploration Activity: Researching a Compound **Discovery Ed Textbook** –Lesson 1.4: Molecules **Middle School Chemistry:** – Chapter 4: The Periodic Table and Bonding – Chapter 5: The Water Molecule and Dissolving **Phet Simulations:** Build an Atom **Other Resources:** –Alien Periodic Table –Common Chemicals WebQuest **TDW Strategies** Using the Research Prompt (Research, Summarize, Restate) to research an atom or molecule. Students can create a PowerPoint Presentation or Near Pod presentation of their research. **Honors:** Create a poster displaying an element and its properties. Create a 3–D Model of an Atom that illustrates the structure, composition, and characteristics of the atom. **Remediation:** Modeling, have students build or draw models of the atoms

10 Days	Chemical Reactions	ALCOS 5 Observe and analyze characteristic properties of substances (e.g., odor, density, solubility, flammability, melting point, boiling point) before and after the substances combine to determine if a chemical reaction has occurred. ALCOS 6 Create a model, diagram, or digital simulation to describe conservation of mass in a chemical reaction and explain the resulting differences between products and reactants. ALCOS 7 Design, construct, and test a device (e.g., glow stick, hand warmer, hot or cold pack, thermal wrap) that either releases or absorbs thermal energy by chemical reactions (e.g., dissolving ammonium chloride or calcium chloride in water) and modify the device as needed based on criteria (e.g., amount/concentration, time, temperature)	AMSTI Kit —Mixtures, Compounds, & Elements –Lesson 10: Chemical Reactions Involving Metals –Lesson 12: Mass and Chemical Reactions –Lesson 11: Countering Corrosion –Lesson 4: Separating Solutes Discovery Ed Textbook –Lesson 1.5: Chemical Reactions and Equations Middle School Chemistry: –Chapter 6: Chemical Change Phet Simulations: Balancing Chemical Equations – Reactants, Products, and Leftovers Other Resources: –Types of Reactions Lab –Ellevation: Chemical and Physical Reactions –Ellevation: Chemical Reaction: Elephant Toothpaste –Ellevation: Identifying Chemical Reactions –Ice Cream Lab TDW Strategies Quick Write: Constructed Response on Discover Education Honors: APLUS COLLEGE READY HANDS ON LABORATORY EXPERIMENT: Types of Chemical Reactions Observing Changes in Matter Remediation: Substance & Chemical Reactions Students will complete a lab that reiterates the differences between chemical reactions and physical mixtures. Review vocabulary by having students create a concept map of both physical and chemical reactions. In addition, students will draw a picture of physical and chemical reactions as well as other key vocabulary terms.

10 Days	Acids, Bases, and Solutions	ALCOS 3 Construct explanations based on evidence from investigations to differentiate among compounds, mixtures, and solutions. ALCOS 3A Collect and analyze information to illustrate how synthetic materials (e.g., medicine, food additives, alternative fuels, plastics) are derived from natural resources and how they impact society. ALCOS 5 Observe and analyze characteristic properties of substances (e.g., odor, density, solubility, flammability, melting point, boiling point) before and after the substances combine to determine if a chemical reaction has occurred.	AMSTI KIT: Properties of Matter –Lesson 9: Exploration Activity: A Manufactured Object –Lesson 10: What Happens When Substances Are Mixed with Water? –Lesson 11: How Much Solute Dissolves in a Solvent? –Lesson 12: Mass, Volume, and Dissolving –Lesson 13: Researching Solvents Discovery Ed Textbook –Lesson 1.1: Combining and Separating –Lesson 1.6: Benefits and Risks of Chemical Use Middle School Chemistry: –Lesson 6.8: pH and Color Change –Lesson 6.9: Neutralizing Acids and Bases –Lesson 6.10: Carbon Dioxide Can Make a Solution Acidic Phet Simulations: Acid Base Solutions, Concentration, pH Scale: Basics Acids and Bases Activity CAUTION: Avoid using Bleach or Ammonia (Teachers should always refer to the Safety Data Sheets when dealing with chemicals in a laboratory setting). Other Resources –Kool–Aid solubility Lab –pH–scale Lab –Ellevation: Earth Day: The Effects of Acid Rain –Small Lab–Acids and Bases http://science–class.net/archive/science–class/Chemistry/acids_bases.htm *TDW Strategies:* Six Word Story: https://hsv–k12.discoveryeducation.com/learn/player/d8ddced1–9474–4621–af0c–b1dd13b08c72 Using this video: https://hsv–k12.discoveryeducation.com/learn/videos/410f287b–55fa–4a7a–be2a–14e9b813f994/

			Honors: Students will evaluate how building a dam affects the society. Students will create a mock town hall meeting. Each member will have a role and research how their stance impacts the community. or Watch video on neutralization, then give students a formula for an acid and a formula for a base, balance the equations to show the neutralization process. –https://hsv–k12.discoveryeducation.com/learn/videos/7077c454–db1d–4213–9efc–b4e3fd985548/ and/or https://hsv–k12.discoveryeducation.com/learn/videos/c0d500db–061f–4d2d–84c3–2c0cafbd2643/ **Remediation:** https://aptv.pbslearningmedia.org/resource/lsps07.sci.phys.matter.cookingsugar/cooking–with–sugar/ This activity presents a scientific definition of sugar, including an illustration of a sugar molecule; explains how candy makers prevent crystallization from ruining their creations; and addresses the question: Is sugar bad for your teeth?

Second Semester

3rd 9 – weeks (January 4 – March 12)

48 instructional days; 24 A–Days and 24 B–Days

Time Period	Unit Topic	Standards	Resources
17 DAYS	Forces	ALCOS 8 Use Newton's first law to demonstrate and explain that an object is either at rest or moves at a constant velocity unless acted upon by an external force (e.g., model car on a table remaining at rest until pushed). ALCOS 9 Use Newton's second law to demonstrate and explain how changes in an object's motion depend on the sum of the external forces on the object and the mass of the object (e.g., billiard balls moving when hit with a cue stick). ALCOS 10 Use Newton's third law to design a model to demonstrate and explain the resulting motion of two colliding objects (e.g., two cars bumping into each other, a hammer hitting a nail).	**AMSTI KIT: Forces and Motion** –Lesson 1: Circuit of Inquiries– A Pre– Assessment –Lesson 2: The Force of Gravity –Lesson 3: The Force of a Rubber band –Lesson 4: The Force of Friction –Lesson 5: Magnetic Forces –Lesson 6: The Earth's Magnetic Force **Discovery Education Textbook:** –Lesson 4.1 – Interaction of Force and Motion –Lesson 4.3 – Gravity –Lesson 4.4 – Friction –Force and Motion Video **Phet Simulations:** –Forces and Motion –Forces and Motion: Basics –Friction –Gravity Force Lab **Other Resources:** –Types of Forces –Scholastic Study Jams –Ellevation: Force and Motion, Force of Gravity, Forces at Work –Levers "R" Us Activity ***TDW Strategies:*** RAFT: Have students read the following article on Forces and Gravity, then write a summary using the RAFT method (Role, Audience, Format, Topic) **Honors:** APLUS COLLEGE READY HANDS ON LABORATORY EXPERIMENT: Force to be Reckoned with Lab **Remediation:** Carousel Brainstorm – students complete charts in groups reviewing the different types of forces

16 DAYS	Motion	ALCOS 8 Use Newton's first law to demonstrate and explain that an object is either at rest or moves at a constant velocity unless acted upon by an external force (e.g., model car on a table remaining at rest until pushed). ALCOS 9 Use Newton's second law to demonstrate and explain how changes in an object's motion depend on the sum of the external forces on the object and the mass of the object (e.g., billiard balls moving when hit with a cue stick). ALCOS 10 Use Newton's third law to design a model to demonstrate and explain the resulting motion of two colliding objects (e.g., two cars bumping into each other, a hammer hitting a nail).	**AMSTI KIT: Forces and Motion** –Lesson 7: Rolling Along –Lesson 8: Exploration Activity: Getting Around –Lesson 9: The Fan Car –Lesson 10: The Mousetrap Car **Discovery Education Textbook:** –Lesson 4.5 – Straight Line Motion **Phet Simulations:** –The Moving Man –Projectile Motion –Pendulum Lab **Other Resources:** –Walk the Line Lab –Ellevation: How Objects Move, Distance vs. Time –Vector Scavenger Hunt –5 STEM Lesson Plans to Teach Forces of Motion –The Science Spot –Science Class Net –Class Tools ***TDW Strategies:*** GIST: Students reflect on content of the lesson, summarize the text, and differentiate between essential and non–essential information in 20 words or less. Should be demonstrated first, then assigned to groups or individuals. **Honors:** APLUS COLLEGE READY HANDS ON LABORATORY EXPERIMENT: Tick Tock –Investigating the Period of a Pendulum Lab Or APLUS COLLEGE READY HANDS ON LABORATORY EXPERIMENT: Velocity vs. Time Graph **Remediation:** Reteach using Think Alouds, or Graphic Organizers **Or** Have students create a collage using pictures that show the Force–mass relationship and Force–acceleration relationship

15 Days	Newton's Laws	ALCOS 8 Use Newton's first law to demonstrate and explain that an object is either at rest or moves at a constant velocity unless acted upon by an external force (e.g., model car on a table remaining at rest until pushed). ALCOS 9 Use Newton's second law to demonstrate and explain how changes in an object's motion depend on the sum of the external forces on the object and the mass of the object (e.g., billiard balls moving when hit with a cue stick). ALCOS 10 Use Newton's third law to design a model to demonstrate and explain the resulting motion of two colliding objects (e.g., two cars bumping into each other, a hammer hitting a nail).	**AMSTI KIT: Forces and Motion** –Lesson 11: The Roller Coaster –Lesson 12: Motion on a Roller Coaster **Discovery Education Textbook:** –Lesson 4.2 – Newton's Laws **Phet Simulations:** Lunar Lander, Balancing Act **Other Resources:** –NASA Newton Cars –Ellevation: Newton's Laws –Ellevation: Newton's Second Law –Teachertube.com videos on Newton's Laws https://www.teachertube.com/videos/newtons–law–1–on–inertia–21642 https://www.teachertube.com/videos/newtons–law–2–on–fma–21643 https://www.teachertube.com/videos/newtons–law–3–on–action–reaction–21646 https://www.teachertube.com/videos/newton–intro–21650 –NBC Learn: NFL and Science Videos –Mini–labs on Newton's Laws ***TDW Strategies:*** Show students the following image from Discovery Ed Textbook. Have students explain why this image is an example of Newton's 3rd Law. **Honors:** Students will design a marble roller coaster model that demonstrate Newton's three laws of motion. Students will calculate the mass and acceleration of the marble to determine the force using the formula F=M(A). Upon completion students will give an oral presentation explaining how all three laws are exhibited in their project. **OR** Students can complete Newton's 2nd Law Quantifying the Relationship Among Force, Mass, and Acceleration Lab **Remediation:** Teacher can reteach by having students create a Bingo game using the definitions. After all games have been created, students can play each other's Bingo Games.

4th 9 – weeks (March 15 – May 28)
46 instructional days; 23 A–Days and 23 B–Days
+4 Exam Days

Time Period	Unit Topic	Standards	Resources
10 Days	Energy	ALCOS 13 Create and analyze graphical displays of data to illustrate the relationships of kinetic energy to the mass and speed of an object (e.g., riding a bicycle at different speeds, hitting a table tennis ball versus a golf ball, rolling similar toy cars with different masses down an incline). ALCOS 14 Use models to construct an explanation of how a system of objects may contain varying types and amounts of potential energy (e.g., observing the movement of a roller coaster cart at various inclines, changing the tension in a rubber band, varying the number of batteries connected in a series, observing a balloon with static electrical charge being brought closer to a classmate's hair). ALCOS 16 Apply the law of conservation of energy to develop arguments supporting the claim that when the kinetic energy of an object changes, energy is transferred to or from the object (e.g., bowling ball hitting pins, brakes being applied to a car).	AMSTI KIT: Electricity, Waves, and Information Transfer –Pre–Assessment: Electricity and Waves Help Us Communicate Discovery Ed Textbook: – Lesson 1.1: Kinetic Energy – Lesson 1.2: Potential Energy – MythBusters: Energy Conservation: Free Energy https://app.discoveryeducation.com/learn/videos/fade2b5a–e962–4663–a6a6–b34b6acf4c6c/ Phet Simulations: –Energy Skate Park Basics –Energy Skate Park Other Resources: – Marble Roller Coaster Lab https://www.scientificamerican.com/article/make–a–marble–roller–coaster/ – Running the Stairs Lab https://www.nms.org/Portals/0/Docs/FreeLessons/MG_Running%20the%20Stairs_web_Open%20Lesson.pdf – Scholastic Study Jams http://studyjams.scholastic.com/studyjams/jams/science/index.htm – eBook from NSTA https://my.nsta.org/ebook/104811/electric–and–magnetic–forces–student–edition –Ellevation: Converting Energy, Forms of Energy, Kinetic and Potential Energy Roller Costar Interactive:

			TDW Strategies: Potential and Kinetic Energy: Constructed Response https://app.discoveryeducation.com/learn/player/34ea5736–b757–49e1–b93e–54e28c9c526a Or Students must provide evidence from labs, activities, research, notes, Discovery Ed Textbook, or other resources to support the following... "Use the Law of Conservation of Energy to support the following claim: when the kinetic energy of an object changes, energy is transferred to or from the object. **Honors:** Students create a 3D or computer model that demonstrates both potential and kinetic energy. ***Or*** https://aptv.pbslearningmedia.org/resource/nuclear–energy–is–fission–the–future/flipside–science–exploring–energy–video/ Types of Energy: Writing Prompt/Debate: After watching the above video, students will choose a stance for or against nuclear energy. Students will research their point of view to find data and trends that support their stance. Students will then have the opportunity to debate in groups of 6 their point of view. **Remediation:** Reteach by having students create a Concept Mobile of Kinetic Energy, Potential Energy, and The Law of Conservation of Energy. This can, also, be done using foldables such as pyramid foldable or layered book foldable. *Resource: Google Dinah Zikes Foldables for more Ideas*.

10 Days	Thermal Energy and Heat	ALCOS 15 Analyze and interpret data from experiments to determine how various factors affect energy transfer as measured by temperature (e.g., comparing final water temperatures after different masses of ice melt in the same volume of water with the same initial temperature, observing the temperature change of samples of different materials with the same mass and the same material with different masses when adding a specific amount of energy)	**AMSTI KIT: Electricity, Waves, and Information Transfer** –Lesson 3: Transforming and Transferring Electrical Energy **Discovery Ed Textbook:** –Lesson 2.3: Heat and Temperature **Phet Simulations:** –Energy Forms and Changes –Friction **Other Resources:** –The Mitten Problem https://learningcenter.nsta.org/products/symposia_seminars/anaheim/uncovering/MittenTeacher.pdf –Temperature Scales Lab https://www.teachengineering.org/activities/view/cub_energy2_lesson06_activity1 –Convection, Conduction, Radiation https://www.teachengineering.org/curricularunits/view/duk_heattransfer_smary_unit –Ellevation: Engineering Design: Solar Ovens –Ellevation: Thermal Energy *TDW Strategies:* Brain Writing: Use an article of choice and have students record what they know or think they know about the topic/subject for a given time period. Next, have students pass their writing to another student to review, add more, or ask questions. **Honors:** Evaluating a Digital Source: Show students a video, website, or article about Thermal Energy. Next, have students evaluate the credibility of the digital source. For example, are the ideas from the digital source based upon facts or inferences? Why? Is the information accurate? Why or why not? How can you improve the digital source to make it more appealing to students? **Remediation:** Reteach by reviewing Boards on Thermal Energy from Discovering Ed Textbook. Once you and your students have reviewed the boards together, then have students create a board of their own. Students must include the definition, an example, and a video.

10 Days	Characteristics of Waves	ALCOS 17 Create and manipulate a model of a simple wave to predict and describe the relationships between wave properties (e.g., frequency, amplitude, wavelength) and energy.) a. Analyze and interpret data to illustrate an electromagnetic spectrum. ALCOS 18 Use models to demonstrate how light and sound waves differ in how they are absorbed, reflected, and transmitted through different types of media.	AMSTI KIT: Electricity, Waves, and Information Transfer –Lesson 5: Detecting Waves –Lesson 6: Wave Transmission: Traveling Through Media Discovery Ed Textbook: –Lesson 3.5: Characteristics and Properties of Waves –Lesson 3.6: Types of Waves –Lesson 3.1: Refraction –Lesson 3.2: Reflection –Lesson 3.7: Light as Wave Energy Phet Simulations: Waves Intro, Waves on a String, Bending Light, Color Vision, Wave Interference, Sound Other Resources: –Ellevation: Wave Characteristics and Information Transfer, Beams of Light, Wave Forms, Wave Models and Wave Energy –eBook NSTA: https://my.nsta.org/ebook/104817/nature–of–light–student–edition –Scholastic Study Jams http://studyjams.scholastic.com/studyjams/jams/science/index.htm –Solar Oven Challenge: https://aptv.pbslearningmedia.org/resource/lsps07.sci.phys.energy.wavelength/wavelength/ *TDW Strategies:* A student makes a claim "that light and sound waves have the exact same properties." Create a claim of your own, that either proves or disproves the students claim. Supply correct evidence to support your claim. Honors: Students in groups create a WebQuest for the distinct types (i.e. one group does sound, another does light) of waves. They will vet the websites for credibility then create questions based upon the information. Remediation: Have students complete a provided WebQuest on waves and highlight two key facts they discovered.

9 Days	Electro–magnetic Waves	ALCOS 19 Integrate qualitative information to explain that common communication devices (e.g., cellular telephones, radios, remote controls, Wi–Fi components, global positioning systems [GPS], wireless technology components) use electromagnetic waves to encode and transmit information.	**AMSTI KIT: Electricity, Waves, and Information Transfer** –Lesson 7: Communicating and Storing Information with Waves –Lesson 8: Waves and Information Transfer: The Global Positioning System –Lesson 11: Electricity and Waves in Medical Technology **Discovery Ed Textbook:** –Lesson 3.3: Transmission and Absorption –Lesson 3.4: Beyond Visibility **Phet Simulations:** –Radio Waves and Electromagnetic Fields **Other Resources:** –Ellevation: The Electromagnetic Spectrum –Ellevation: Information in Waves –Cosmic classroom http://coolcosmos.ipac.caltech.edu/sitemap.html#cosmicclassroom –Teach Engineering: Exploring the EM Spectrum https://www.teachengineering.org/lessons/view/clem_waves_lesson04 *TDW Strategies:* QAR (Question/Answer Relationships) – students read a passage and distinguish between 'In the Book QAR's' and 'In my Head QAR's' by writing both types of questions. 'Book QARs' are either right there in the text or think and search types. 'Head QARs' are not found in the passage, but the answers are determined through using the students' own experiences. **Honors:** Create/draw an invention that can use electromagnetic waves to encode and transmit information. Explain how your invention uses electromagnetic waves, the benefits of electromagnetic waves. Explain the benefits of your invention. **Remediation:** Reteach by showing a picture of a cellular telephone, radio, remote controls, Wi–Fi components, or GPS and explain how it uses electromagnetic waves.

9 Days	Magnetism and Electro–magnetism	ALCOS 11 Plan and carry out investigations to evaluate how various factors (e.g., electric force produced between two charged objects at various positions; magnetic force produced by an electromagnet with varying number of wire turns, varying number or size of dry cells, and varying size of iron core) affect the strength of electric and magnetic forces. ALCOS 12 Construct an argument from evidence explaining that fields exist between objects exerting forces on each other (e.g., interactions of magnets, electrically charged strips of tape, electrically charged pith balls, gravitational pull of the moon creating tides) even when the objects are not in contact. ALCOS 19 Integrate qualitative information to explain that common communication devices (e.g., cellular telephones, radios, remote controls, Wi–Fi components, global positioning systems [GPS], wireless technology components) use electromagnetic waves to encode and transmit information	AMSTI KIT: Electricity, Waves, and Information Transfer –Lesson 4: Electricity and Motion Discovery Ed Textbook: –Lesson 5.1: Static Charges –Lesson 5.2: Electricity and Magnetism Relationships Phet Simulations: –Faraday's Law –Magnets and Electromagnets –John Travoltage –Balloons and Static Electricity –Charges and Fields Other Resources: –Rail Gun Activity http://sciphile.org/lessons/classroom–rail–gun –Ellevation: Converting Energy –Magnet Academy https://nationalmaglab.org/education/magnet–academy/plan–a–lesson –Exploring Magnetism http://cse.ssl.berkeley.edu/SEGwayed/lessons/exploring_magnetism/exploring_magnetism/index.html–Electromagnetic Power https://www.regent.edu/acad/schedu/pdfs/mcms/electromagnetic_power.pdf –Building an Electromagnet https://www.teachengineering.org/activities/view/van_cleanupmess_act4 –Virtual Tour of the Electromagnet Spectrum https://aptv.pbslearningmedia.org/resource/phy03.sci.phys.mfw.spectrum/tour–the–electromagnetic–spectrum/ *TDW Strategies:* Construct an argument from evidence explaining that fields exist between objects exerting forces on each other even when the objects are not in contact. Or Construct an argument showing the relationship between the electrically charged particles in a magnet to the electrically charged particles in an atom.

			Honors: Students will illustrate a comic strip that constructs an explanation about factors that affect the strength of an electromagnetic forces. **Remediation:** Reteach by using the following video from Discovery Ed Techbook. https://hsv–k12.discoveryeducation.com/learn/techbook/courses/science Have students draw a picture and explain how magnetism and electromagnetism are alike. *Or* Reteach by showing the video "Junkyard Electromagnet" https://hsv–k12.discoveryeducation.com/learn/videos/f280990e–b625–4b55–8df2–2b3936c64a9c/ Have students predict the ending. Then show students the video "Breaking the Evidence," the conclusion to video 1. Discuss the outcome. https://hsv–k12.discoveryeducation.com/learn/videos/9a1a8164–2307–4dcb–9dbf–8123a00fd584/